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Front-Wheel Support for a Wheel Chair

CROSS REFERENCE TO RELATED APPLICATIONS

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This application claims priority of European Patent Application No. EP 03 004 757.5, filed 04 March 2003, incorporated herein by reference.

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The present invention relates to a front-wheel support for a wheel chair in accordance with claim **1**, and wheel chair comprising such a front-wheel support, in accordance with claim **10**.

FIELD AND BACKGROUND OF THE INVENTION

Wheel chairs typically have one or two front wheels. These front wheels are fixed to the frame of the wheel chair by means of a front wheel support. The

front wheel support is usually designed to be operated in a upright position where the front wheel fork turns about an axis that is essentially vertical with respect to the ground.

5 When changing the geometry of the whole wheel chair, e.g. when adjusting the seat heights and inclination, the frame of the wheel chair is tilted with respect to the ground. This leads to a situation where the front wheel support is not longer in an correct upright position. Due to this, the front wheel cannot move and turn as freely as intended. This means that after having modified
10 the wheel chair's geometry, one usually has to adjust the front wheel support to bring the axis in an upright position.

Known wheel chairs require for such an adjustment several screws to be loosened, the support to be adjusted and the screws to be tightened again. Other
15 solutions require special tools. Since the adjustment of known wheel chairs is complicated, authorized dealers or specialists are required to perform this task.

OBJECT OF THE INVENTION

20 It is an objective of the present invention to provide a front wheel support that can more easily be adjusted.

It is another objective of the present invention to provide a front wheel support that is stable and light weight.

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SUMMARY OF THE INVENTION

The object of the invention is attained by means of the features of claim **1** or **10**.

30 Preferred embodiments of the wheel chair in accordance with the invention are defined by the dependant claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in detail and with the help of the drawings.

5	Fig. 1A	schematically shows a first front wheel support of a wheel chair in accordance with the invention;
	Fig. 1B	schematically shows a side view of the first front wheel support of a wheel chair in accordance with the invention;
10	Fig. 1C	schematically shows a top view of the first front wheel support of a wheel chair in accordance with the invention;
15	Fig. 2	schematically shows a side view of a wheel chair in accordance with the invention;
	Fig. 3A	schematically shows a side view of the first front wheel support of a wheel chair in accordance with the invention;
20	Fig. 3B	schematically shows a side view of the first front wheel support of a wheel chair in accordance with the invention;
25	Fig. 3C	schematically shows a front view of the first front wheel support of a wheel chair in accordance with the invention;
30	Fig. 4A	schematically shows a second front wheel support of a wheel chair in accordance with the invention;

Fig. 4B schematically shows a partial view of the second front wheel support of a wheel chair in accordance with the invention; and

5 **Fig. 5** schematically shows a third front wheel support of a wheel chair in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A first embodiment, according to the present invention, is depicted in **Figs. 1A**
10 **1B**, and **1C**. The front wheel support **10** for a wheel chair is depicted. Only part of a frame member **9** of the wheel chair is visible. The front wheel support **10** comprises a first curved part in form of a curved tube **11** being attached to the frame member **9** of the wheel chair. In the present embodiment, the first curved tube **11** is attached to the frame member **9** by means of welding. The first
15 curved tube **11** may also be an integral part of the frame member **9**. A second curved part **12**, which may be a tube part or a massive part, is provided. The curved tube **11** and the curved part **12** can be bended in the direction as depicted or in another direction.

20 This second curved part **12** has a first portion **12.1** with a curvature being identical to the curvature of the first curved tube **11**. Furthermore, the first portion **12.1** has a cross section **A1** allowing the first portion **12.1** to fit inside the first curved tube **11**, as illustrated in **Fig. 1B**. The second curved part **12** comprises a second portion **12.2** with a wheel fork seat for mounting a front wheel fork of
25 said wheel chair. The front wheel fork and the front wheel are not visible in **Figs. 1A, 1B**, and **1C**.

It is important for the front wheel support **10** to be very stable. This requires the second curved part **12** to form a tight fit inside the first curved tube **11**. This
30 tight fit needs to be releasable in order to allow the front wheel support **10** to be adjusted. According to the present invention, a special securing arrangement **14** is provided. The front wheel support **10** illustrated in the **Figs. 1A, 1B**, and **1C** comprises a section that can be extended or expanded when being situated in-

side the first curved tube **11** in order to form a tight fit with respect to the second curved part **12**. For this reason, the first portion **12.1** has a fork-like shape with two ends **12.3**. These two ends **12.3** are spaced apart so that a screw **15** together with a conical element **16** fits between the two ends **12.3**, as illustrated in **Fig. 1C**. When turning the screw **15**, the conical element **16** is pushed between the two ends **12.3** of the first portion **12.1**. Due to this, the two ends **12.3** are expanded and pushed against the inner wall of the first curved tube **11**. The load path is provided between the first portion **12.1** of the second curved part **12** and the first curved tube **11** if the screw **15** is in the right position. The securing arrangement **14** can be released by turning the screw **15** in the opposite direction. The two ends **12.3** will return to their original position since the conical part withdraws.

A schematic representation of a wheel chair **20** is given in **Fig. 2**. The wheel chair **20** comprises at least one front wheel support **10**, according to the present invention. This front wheel support **10** comprises a first curved tube **11** being attached to the frame member **9** of the wheel chair. In the present embodiment, the first curved tube **11** is attached to the frame member **9**. The first curved tube **11** may be an integral part of the frame member **9**, as illustrated in **Fig. 2**. A second curved part **12** is provided.

This second curved part **12** has a first portion **12.1** with a curvature being identical to the curvature of the first curved tube **11**. The second curved part **12** comprises a second portion with a wheel fork **13** for mounting a front wheel **22** of said wheel chair **20**. The wheel chair **20** further comprises a rear wheel **22**.

Further details of the embodiment of **Figs. 1A** through **1C** are depicted in **Figs. 3A** through **3C**. According to the present invention, a special securing arrangement **14** is provided. The front wheel support **10** illustrated in the **Figs. 3A**, **3B**, and **3C** comprises a section that can be extended or expanded when being situated inside the first curved tube **11** in order to form a tight fit with respect to the second curved part **12**. For this reason, the first portion **12.1** has a fork-like shape with two ends **12.3**. These two ends **12.3** are spaced apart so that a

screw **15** together with a conical element **16** fits between the two ends **12.3**, as illustrated in **Fig. 3C**. When turning the screw **15**, the conical part **16** is pushed between the two ends **12.3** of the first portion **12.1**. Due to this, the two ends **12.3** are pushed against the inner wall of the first curved tube **11**. The load path is provided between the first portion **12.1** of the second curved part **12** and the first curved tube **11** if the screw **15** (not visible in any of the **Figs 3A** through **3C**) is in the right position. The securing arrangement **14** can be released by turning the screw **15** in the opposite direction. The two ends **12.3** will return to their original position since the conical part **16** withdraws.

Yet another embodiment is depicted in **Figs. 4A** and **4B**. The first curved tube **11** is attached to the frame **9**. According to this embodiment, the second curved part **12** comprises a longitudinal slit **12.4**. The securing arrangement **14** comprises a sliding element **14.1** with a threaded hole **14.2** and a screw. This screw is not visible in the **Figs. 4A** and **4B**. The screw sits in a mounting piece **14.4** that is attached to the outside of the first curved tube **11**. The screw is inserted through a hole **14.5** in the mounting piece **14.4** and sits in the threaded hole **14.2** of the sliding element **14.1**. and the screw is accessible from outside through the longitudinal slit **12.4**. The sliding element **14.1** moves together with the first portion **12.1** inside the first curved tube **11** up or down, if the second curved part **12** is pushed into or pulled out of the first curved tube **11**. When the correct position of the front wheel support is reached, the screw is tightened. Due to this, the sliding element **14.1** together with the second curved part **12** is fixed with respect to the first curved tube **11** and the mounting piece **14.4**.

Figs. 4A and **4B** also show that the second curved part **12** comprises a second portion **12.2** with a wheel fork seat **13** for mounting a front wheel fork of said wheel chair.

According to another embodiment, the first curved tube **11** comprises a securing arrangement **14** with a nut **17**. This nut **17** sits on the end portion **11.1** of the first curved tube **11**. The end portion of the first curved tube **11** is threaded allowing the nut **17** to be fixed or released by turning it. Inside the first curved

tube **11** there is a conical part. This conical part sits on the first portion **12.1** of the second curved part **12**. When fixing the nut **17**, the conical part provides for a tight fit between the end portion **11.1** of the first curved tube **11** and the first portion 12.1 of the second curved part **12**. The principle is similar to the one
5 being used in connection with garden hoses or pipes where one cylindrical piece is to be tightly connected to another cylindrical piece in the same manner. The difference, however, is in the dimensions and materials used. Since the front wheel support **10** has to be stable, a more solid and rigid version is required.